

REMARKS

Claims 1-4, 6, 9-10, 12-17, 34-37, 39, 42-43, 45-49 and 66-69 are now pending in this application. Claims 1-4, 6, 9-10, 12-17, 34-37, 39, 42-43, 45-49 and 66-69 stand rejected under 35 U.S.C. § 103(a) as being allegedly being anticipated by United States Patent Publication 2002/0064308 (“Altman”) in view of United States Patent 6,687,876 (“Schlit”). Applicants respectfully traverse.

Claims 1-4, 6, 9-10, 13-16, 34-37, 39, 42-43, 45-49 and 66-69 have been amended.

Rejection Of Claims 1-4, 6, 9-10, 12-16 and 68-69 Under 35 U.S.C. § 103(a)

Claims 1-4, 6, 9-10, 12-16 and 68-69 stand rejected under 35 U.S.C. § 103(a) as being anticipated by Altman in view of Schlit. Claim 1 as amended recites a method for asynchronous receipt and processing of electronic ink annotation of a document, *comprising generating a first analysis context object, the first analysis context object providing a translation layer for a document model of a current state of a relationship of elements in the document and comprising a tree data structure for storing document elements in a hierarchical relationship.*

Claim 1 further recites *starting a first thread, wherein the first thread updates the first analysis context object based upon a user interaction with the document, the user interaction including electronic ink annotation and upon an event requiring analysis of new data in the document suspending the execution of the first thread so as to prevent changes to the first analysis context object, starting a caching thread for receiving changes to the document based upon user interaction, starting a second thread, wherein the second thread generates a second analysis context object corresponding to a portion of the first analysis context object, wherein the portion corresponds to a designated region of the document.*

Claim 1 further recites *upon completion of generation of the second analysis context object suspending the execution of the second thread, suspending execution of the caching thread, restarting the first thread and performing a first analysis of the second analysis context object to generate a third analysis context object from the second analysis context object, wherein the third analysis context object is generated by parsing the new data and modifying the second analysis context object based on the new data and further includes*

classification information for the new data.

Claim 1 further recites *upon completion of the first analysis suspending execution of the first thread so as to prevent any changes to the first document context object, restarting the caching thread, starting a third thread, wherein the third thread reconciles the third analysis context object with the first analysis context object to generate first reconciled analysis results.*

Claim 1 as amended further recites *upon completion of the reconciliation of the first analysis context object and the third analysis context object, updating the first analysis context object with the first reconciled analysis results, suspending the execution of the third thread, suspending the execution of the caching thread and restarting the first thread.*

The specification describes a method and system for electronic ink processing techniques that can be used by a variety of software applications to process electronic ink. The method and system allows for the electronic ink to be processed asynchronously with regard to the operation of the software application, so that the electronic ink can be processed without stopping or significantly delaying the operation of the software application. The software application may continue to accept new electronic ink input while previous electronic ink input is being processed.

Using spatial information to describe the elements of a document, the software application managing the document may maintain a data structure describing the relationship between its document elements. In particular, the software application can maintain a data structure both describing the class of the various document elements and defining associations between the various document elements. These associations can be defined, for example, as information used to link electronic ink stroke data or collections thereof to other elements in the electronic document (such as words, lines, paragraphs, drawings, table cells, etc.).

To analyze new electronic ink input into a document, the software application managing the document may modify a data structure associated with the document to include the new ink to be analyzed. The software application can then provide this data structure (or relevant portions thereof) to an ink analysis tool, which copies some or all of the data structure for analysis (and operates on this copy of the data that is independent of the application program's document data structure). The ink analysis tool may pass the copy to an

analysis process, such as a parsing process (e.g., a layout analysis process and/or a classification process). The software application may resume its normal operation, including receiving new electronic ink input and/or other data, while the ink analysis process(es) is (are) being performed. After all desired analysis processes are completed, the analysis results are returned to the ink analysis tool.

In response to receiving the analysis results, the ink analysis tool may obtain the current version of the electronic document's data structure (which may contain new and/or modified data entered while the analysis processes were performed) from the software application, and reconciles the analysis results with the current version of the data structure. The reconciliation can be called upon by any software application, without the need for complex internal locking provisions. After reconciling the analysis results with the current version of the data structure, the ink analysis tool may then provide a copy of the reconciled analysis results to another analysis process, such as a handwriting recognition process. The software application may then resume its normal operation, including receiving new electronic ink input and/or other data, while the second ink analysis process(es) is (are) being performed. After all of the desired second analysis processes are completed, the results of the second analysis process are returned to the ink analysis tool.

The ink analysis tool may then obtain the current version of the data structure from the software application (which again may include new and/or modified data), and reconciles the second analysis results with the current version of the data structure. The ink analysis tool may then update the data structure using the reconciled results of the second analysis process. Any number of ink analysis procedures and/or stages can be employed.

A reusable annotation parser is capable of determining the relation of possible ink annotations to various different types of electronic documents. Specifically, a mechanism may be provided with the annotation parser that calls back to the application program to provide relevant information relating to the ink being parsed (e.g., information relating to the electronic document in the spatial area corresponding to the ink annotation, to provide "context" to the ink annotation). The mechanism is easy enough to be practical to integrate into any document-based application, and it is efficient enough to work for very large documents (which can be processed in sections, such as pages or the like).

The ink processing techniques thus may allow a variety of software applications to

perform multiple processes on electronic ink through the ink analysis tool. Moreover, a software application using these techniques can continue its normal operation during the analysis process, including receiving new electronic ink input without necessarily invalidating the results of the analysis processes.

Altman relates to a system and method for spacing, storing and recognizing electronic representations of handwriting, printing, computer text, bit maps, and drawings. Altman describes a system comprising a central processing unit that couples with a display device, an input device, and a memory. The memory includes means for spacing ink stroke representations, means for recognizing outline elements, means for performing deferred recognition, means for highlighting drawing areas and means for storing and displaying ink stroke representations.

Altman describes a plurality of methods including a method for managing space between ink stroke representations, a method for displaying drawing elements in a visually distinct manner, a method for recognizing bullets and dashes, a method for storing ink stroke representations, a method for displaying and printing ink stroke representations, and a method for performing deferred character or word recognition.

However, Altman fails to teach or suggest a first analysis context object that provides a translation layer for a document model of a current state of a relationship of elements in the document and comprising a tree data structure for storing document elements in a hierarchical relationship.

Altman further fails to teach or suggest any type of thread structure of asynchronous processing of ink annotations and therefore certainly fails to teach or suggest starting a first thread, wherein the first thread updates the first analysis context object based upon a user interaction with the document, the user interaction including electronic ink annotation and upon an event requiring analysis of new data in the document as recited in amended claim 1. Altman further fails to teach or suggest suspending the execution of the first thread so as to prevent changes to the first analysis context object, starting a caching thread for receiving changes to the document based upon user interaction, starting a second thread, wherein the second thread generates a second analysis context object corresponding to a portion of the first analysis context object, wherein the portion corresponds to a designated region of the document as recited in claim 1.

Thus, Altman also does not disclose upon completion of generation of the second analysis context object suspending the execution of the second thread, suspending execution of the caching thread, restarting the first thread and performing a first analysis of the second analysis context object to generate a third analysis context object from the second analysis context object, wherein the third analysis context object is generated by parsing the new data and modifying the second analysis context object based on the new data and further includes classification information for the new data as recited in claim 1.

Nor does Altman disclose upon completion of the first analysis suspending execution of the first thread so as to prevent any changes to the first document context object, restarting the caching thread, starting a third thread, wherein the third thread reconciles the third analysis context object with the first analysis context object to generate first reconciled analysis results.

And, Altman further fails to teach or suggest upon completion of the reconciliation of the first analysis context object and the third analysis context object, updating the first analysis context object with the first reconciled analysis results, suspending the execution of the third thread, suspending the execution of the caching thread and restarting the first thread.

Schlit fails to cure the deficiencies of Altman. Thus, as the cited references fail to teach or suggest the claim limitations of claim 1, claim 1 should be allowed. Claims 2-4, 6, 9-10, 12-16 and 68-69 depend from and therefore include all the limitations of claim 1. Thus, for at least the reasons stated with respect to claim 1, claims 2-4, 6, 9-10, 12-16 and 68-69 should be allowed.

Claims 34-37, 39, 42-43, 45-49

Claim 34 as amended includes limitations similar to amended claim 1 including a first, second and third analysis context object and a thread structure for asynchronous processing of electronic ink notation. Thus, for at least the reasons stated with respect to claim 1, claim 34 should be allowed. Claims 35-37, 39, 42-43 and 45-49 depend from and therefore include all the limitations of claim 34. Thus, for at least the reasons stated with respect to 35-37, 39, 42-43 and 45-49 should be allowed.

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Conclusion

In view of the above amendments and remarks, applicant respectfully submits that the present invention is in condition for allowance. Reconsideration of the application is respectfully requested.

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